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## ABSTRACT

Professional knowledge created as teachers interact with the complexity of variables related to teaching and learning in active, thoughtful, reflective practice, is essential to expert teaching. This qualitative study is designed to describe and define the factors (processes) that are pertinent to the process of reflection as it is utilized by three expert teachers (enablers) who teach homogeneously grouped, academically gifted learners in three public school districts in Illinois. A modified form of analytic induction was employed as an approach to collecting and analyzing data as well as to developing and testing theory. Two main categories, problem solving and theory building, were derived through the analytic processing of raw data. The phenomenon of reflection in teaching was defined as thinking about teaching or reflection-on-action, and as thinking while teaching or reflection-in-action. Results suggest that reflection plays an important role in teaching; some teachers are reflective professionals who engage in a type of problem solving as they seek to integrate their value beliefs, theoretical knowledge, craft knowledge, and experience with the context in which they teach and build their own theories about teaching. (Contains 25 references.) (LL)

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## A QUALITATIVE STUDY OF REFLECTIVE TEACHING

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## INTRODUCTION

Each day practitioners face a host of complex, context-specific problems about which there are no easy answers. No singular "right" course of action is available, although practitioners can envision certain courses as better than others. In facing these problems, they must take action. Underlying these actions is a personal, guiding theory. By pausing to reflect, by reaching inward and attempting to understand that personal theory of action, teachers...exercise the most professional aspect of practice.

(McCutcheon, 1985, p.48)

As a teacher faces a complex, ill-defined, context-specific problem and decides on a course of action, the teacher is engaging in reflective practice. As thought and action work together in this reflective practice, a teacher creates professional knowledge (Sergiovanni, 1987). Reflection in teaching encompasses the thinking a teacher does about teaching, as well as the thinking done while teaching. In discussing how practitioners of various professions utilize reflection, Schon (1983) terms thinking done about one's profession as "reflection-on-action" and thinking done about the situation at hand as "reflection-in-action." Though Schon talks about these as separately distinguishable processes, he presents the processes as being interrelated. This would imply that the thinking a teacher does about teaching may have some relation to the thinking a teacher does while teaching, and the reverse may also be true.

According to Dewey (1933), it is the utilization of reflection in teaching that emancipates us from merely impulsive and routine activity . . . [and] enables us to direct our actions with foresight and to plan according to ends in view of purposes of which we are aware. [Reflection] enables us to know what we are about when we act. (p.17)

Research has provided a *scientific basis* for teaching. There are a variety of psychological, social, and educational theories that hold implications for teaching and learning in the classroom. There is research on effective teaching practices that identifies and describes teaching skills and behaviors that correlate positively with

student achievement. There also exists a body of craft knowledge or "wisdom of the profession" that "consists of distillations... of experience passed on from teacher to teacher" (Smith, 1980). As Sergiovanni (1987) observes, "The issue is not whether scientific or craft knowledge should be used but how they are used by professionals in practice" (p.xv).

### Statement of the Problem

Scientific or theoretical knowledge, while not directly applicable because of the uniqueness of each situation, is somehow useful to practitioners as they engage in reflective practice and create professional knowledge. Craft knowledge--"a mixture of theories, beliefs, and values about the teachers' role and about the dynamics of teaching and learning" (Zeichner, Tabachnick & Densmore, 1987) is also useful to practitioners as they engage in reflective practice and create professional knowledge. Recognizing this reality, Schon (1983) has stated the problem for this study:

We are in need of inquiry into the epistemology of practice. What is the kind of knowing in which competent practitioners engage? How is professional knowing like and unlike the kinds of knowledge presented in academic textbooks, scientific papers, and learned journals? In what sense, if any, is there intellectual rigor in professional practice?  
(p. viii)

Routine application of that which has been identified in research as effective teaching skills without reflection may result in competent teaching, but arid instruction, and in a demonstration of the craft of teaching, but little artistry (Ducharme & Kluender, 1986). Berliner (1987) has concluded on the basis of studies of expert teachers that individuals with motivation to excel at teaching and in possession of a set of strategies for learning from experience--or the ability and desire to reflect--will become transformed by their experience. According to Berliner, they become experts in teaching.

Macrorie (1984) describes the characteristics of teachers who were identified as exceptional or expert teachers as he presents these teachers in twenty case studies. Macrorie applies the name "enabler" to these teachers because of their ability to enable their students to produce good works--those things that "learners write, speak, or construct that counts for them, their fellow learners, their teachers, and persons outside the classroom" (p.xi). Macrorie's enablers are teachers who can be characterized as possessing attitudes of openmindedness, responsibility, and wholeheartedness, along with the technical skills for inquiry and problem solving. This combination of attitudes and skills is what Dewey (1933) used to portray his ideal for the reflective teacher.

#### Purpose of the Study

Professional knowledge that is created as teachers interact with the complexity of variables related to teaching and learning in active, thoughtful, reflective practice, is essential to expert teaching. The purpose of this study was to describe and define the factors (processes) that are pertinent to the process of reflection as it is utilized by enablers who teach homogeneously grouped, academically gifted learners. The further purpose of this study was to develop substantive grounded theory, firmly based in the empirical data. It is through research into how enablers utilize reflection--or, as Calderhead (1987) says, "how professional knowledge bases develop and are influenced, how they interact in professional planning, and how teachers' knowledge becomes embedded in action and informs classroom routines" that "new conceptualizations of teaching may emerge, which in turn can guide efforts to support and improve the quality of teachers' professional practice" (p.19).

#### METHODOLOGY OF THE STUDY

Micro-ethnographic research focuses on particular cultural scenes within key

institutional settings that are salient to people in a community because the activities that occur within the settings are crucial to shaping the character of individual and group life. Furthermore, micro-ethnographic research focuses beyond what people do, "to how the doings get done" (Spindler, 1982, p.138). The research in this study focused on the classrooms of three teachers--expert teachers or "enablers"--who teach homogeneously grouped, academically gifted learners in three public school districts in Illinois. The purpose of this study was to discover, describe, and analyze how these enablers utilize reflection in teaching.

Theory that is developed from the data as that data exists in a particular setting, through the use of inductive analytic processes, is considered to be grounded theory (Glaser & Strauss, 1967). For this study a modified form of analytic induction was employed as an approach to collect and analyze data as well as to develop theory and test it. Analytic induction is an appropriate procedure to employ when some specific problem, question, or issue becomes the focus of the research (Bogdan & Biklen, 1982). The analytic induction strategy insures reflexivity in the relationship between research design, data collection, and data analysis, and leads to the discovery and verification of theory grounded in the empirical data (Katz, 1982, Erickson, 1986).

#### Defining the Phenomenon

The researcher began the study with what is commonly referred to in qualitative studies as a rough formulation of the phenomenon to be explained, having derived this from the initial literature review. For this study, the phenomenon of reflection in teaching was defined as thinking about teaching or reflection-on-action, and as thinking while teaching or reflection-in-action. Also on the basis of the initial literature search, the field of study was defined as the classrooms of enablers who teach homogeneously grouped, academically gifted learners. From this, two of three working hypotheses for

the study were generated:

Hypothesis 1: Reflection in teaching, as utilized by enablers who teach homogeneously grouped, academically gifted learners, consists of factors (processes).

Hypothesis 2: These factors (processes) are related to each other in some manner.

Furthermore, from the literature, reflection was described as possibly occurring in two distinct temporal settings, described by Jackson (1968) as the preactive phase, indicative of those teacher activities occurring when the teacher is not in the classroom working with students, and the interactive phase, described as the phase when the teacher is in the classroom working with students. Calderhead (1987) noted that Jackson concluded there was something different in the thinking processes that occur in these two phases of teaching:

Before the day starts or after the children have gone home, teachers are reflective about their teaching, and they engage in processes that resemble formal problem-solving. But in face-to-face interaction in the classroom, teachers are more intuitive and spontaneous (p.8).

From the above, the third working hypothesis for the study was generated, regarding the temporal considerations of reflection in teaching:

Hypothesis 3: Reflection is utilized differently in the preactive and interactive phases of teaching.

### The Sampling

This study employed purposeful sampling, particular subjects included because they are believed to facilitate expansion of the developing theory (Bogdan & Biklen, 1982). The population of interest in this study were teachers who fit the criteria for enabler while teaching homogeneously grouped, academically gifted learners.

### Data Collection and Analysis

When analytic induction is employed, data are collected and analyzed to develop

a descriptive model or theory that encompasses all cases of the phenomenon that is the focus of the research. Analytic induction is unique in that it seeks to combine the process of discovery of theory with that of verification of theory. Early in the study, a rough definition or explanation of the particular phenomenon is developed, which is then held up to the emerging data and modified to fit the data. Negative cases or instances are actively sought that do not fit the working hypotheses. The phenomenon is redefined and the working hypotheses are reformulated until an accurate relationship is reflected in the resulting theory (Bogdan & Biklen, 1982). Data collection and analysis as done by researchers using analytic induction is simultaneously inductive and deductive, exhibiting a "double fitting" of fact to theory and theory to fact, which is more correctly referred to as "retroduction" (Baldamus, 1972). In searching for positive and negative instances regarding the phenomena, the researcher is led into a holistic analysis that binds propositions and data into an intricate network where each proposition is a combination of the empirical data. To convert disconfirming data into confirming data, it is necessary to qualify concepts and generate explanatory propositions which results in a complex analytic framework that supports any proposition and is illustrated by the data (Katz, 1982).

As part of the process of discovery, the factors (processes) that are relevant to utilizing reflection in teaching were described in this study, as were the interrelationships that exist among these factors (processes). Working hypotheses concerning these factors and their interrelationships were examined in light of each new piece of data, which resulted in reformulation of the hypotheses, or in reconceptualizing the phenomenon of reflection in teaching when a negative case or instance was encountered. In this way, theory about the utilization of reflection in teaching was both constructed and verified from the data.



Theory derived from a limited sample size and specificity of the sort in this study is to be considered substantive theory, a special instance of middle-range theory that is applicable to limited conceptual ranges while focusing on a particular problem area (Denzin, 1970). "A theoretical analysis at the substantive level, though more modest in scope and power than formal theory, gives the analyst tools for explaining his or her data as well as tools for making predictions" (Charmaz, 1983, p.126).

### DATA ANALYSIS

The body of materials collected in the field for a study such as this are raw data that use words as the basic medium. "Data analysis is the process of systematically searching and arranging the interview transcripts, fieldnotes, and other materials. . . to increase. . . understanding of them. . ." (Bogdan & Biklen, 1982, p.145).

In reporting qualitative data, it is not possible to present all the data collected. It becomes the aim of the researcher, therefore, to provide evidentiary warrant for assertions in the form of vignettes or particular description that portray the actions and narrative of the informants in the study. That part of the analysis has been excluded from this paper due to the extreme length of the data presentation, but is available upon request from the researcher to anyone who would desire to peruse it.

It should also be noted that the theory derived from the data was completely the product of the researcher's analysis of the data as that data existed in the research setting. At no point in the analysis was there any effort to fit data into pre-existing theories, which were, in reality, unknown to the researcher until after she had developed the theoretical framework from the empirical evidence. Once the grounded theory had been developed, the researcher did discover from the literature that constructs from the fields of sociology and cognitive psychology seemed to resonate the conceptual findings of this study. These are presented to support the plausibility of the grounded

theory developed from the data in this study.

The researcher discovered that it was possible to organize the particular description for this study under the two main headings of Problem Solving and Theory Building, formal analytic concepts, which were derived through the researcher's analytic processing of the raw data into concrete conceptual categories and then into higher level, more abstract conceptual categories that could be applied to large amounts of data. These formal analytic concepts of Problem Solving and Theory Building will be presented through description of factors (processes) of reflection in teaching, which were also derived from the researcher's analytic processing of data into categories that would denote the process evident in the data. The factors are interrelated, and the various factors should not be viewed as mutually exclusive categories.

#### Problem Solving and Theory Building

Reflection in teaching entails the use of two major processes, problem solving and theory building. Problem solving is used here in the same sense as it is in cognitive psychology to mean mental operations and steps directed toward a particular goal. A variety of skills are part of the problem solving process, including observing, listening and questioning, decision making, analyzing, evaluating, inferencing, and synthesizing.

Theory building is used in the sense of cognitive ordering of knowledge and events, and not in the sense of scientific or formal theory building. Theories are generated in two ways: inductively, organizing observed data into a cognitive structure from which generalizations and additional theoretical claims evolve; or deductively, from hypothesis testing of existing theories, through subjecting the propositions to the data and followed by reformulating, modifying, or confirming the existing theory.

Problem solving and theory building are intertwined within and between the preactive and interactive phases of teaching. Problem solving may begin in the preactive

phase and involve decision making with regard to planning for an interactive phase of teaching. Existing theories are generalized into the lesson. Once into the interactive phase of teaching, the theories that were part of the planning of the lesson are tested and reformulated, modified, or confirmed. At the same time, new information is being observed and collected that will be cognitively structured into theories that will be useful in the preactive phase activities of evaluation or planning. All of this is reflection-on-action.

In addition to the above interactive problem solving and theory building, problem solving and theory building are carried on at a very rapid rate within the interactive phase as the teacher seeks information about the learner's learning in a problem solving process aimed toward making learning happen. This information is rapidly categorized and theories are generated. Simultaneously, existing theories are tested from the teacher's repertoire of knowledge and experience with regard to what will work or will achieve the goal of getting the learner to learn. This is reflection-in-action. Information gathered and theories generated during reflection-in-action may then become part of reflection-on-action when the teacher thinks about the teaching episode.

#### The Factors (Processes) of Reflection in Teaching

##### Using Value Beliefs as Working Premises

Most basic to the thinking these enablers did about teaching, as reflection-on-action, and to the thinking while teaching, as reflection-in-action, were the value beliefs they maintained about teaching and learning. These value beliefs became the working premises from which the enablers approached teaching and learning, both during the preactive and interactive phases of teaching. Davis (1978) defined value beliefs as "convictions about the worth or desirability of particular objects or conditions" (p.130). He explained that "value beliefs provide the basis for making value judgments that some

things are good or bad, better or worse than other things" (p.130).

Value beliefs were used in problem solving during the preactive phase of teaching, serving as the reason why certain actions were taken or decisions were made in a particular direction. Decisions about planning for programs, curriculum, lessons, and evaluation of teaching and learning were framed within the value belief system. Actions were taken that would bring into existence the condition or thing that was valued or that would perpetuate what was valued.

Value beliefs were used in theory building during the preactive phase, theories being generated on the basis of value beliefs. These theories were related to how the desired conditions or things might be brought into existence or perpetuated. These theories were generated with regard to value beliefs about what was to be the goal of the curriculum, how the special gifted curriculum was to relate to the regular classroom curriculum, what the classroom environment was to be, how the learner was to be viewed, how the teacher role was to be defined, how evaluation of learners was to be accomplished, how the effectiveness of teaching episodes would be evaluated, and how the total program and its curriculum were to be perceived.

Value beliefs were used in problem solving during the interactive phase of teaching in order to identify or recognize problems. Situations would be framed in the context of the desired condition to which the value belief pertained. The goal of the problem solving was to bring into existence or to insure the perpetuation of the desired condition of the value belief. Inconsistencies between an event or condition and a value belief were identified as problems. These generally were related to value beliefs about the learner and learning, the teacher and teaching, the goals of the subject matter, or the classroom environment.

Value beliefs were the basis for theories that were generated about the learner

and learning, the teacher and teaching, the subject matter, and the classroom environment. These theories were brought into the interactive phase and were acted upon, sometimes as the reason for action, and sometimes serving as motivation for the action so the desired condition would come into existence. Acting upon these theories generated from value beliefs provided consistency in the actions of the enablers toward the learners, the approach taken toward student learning, teaching strategies, the role of the teacher, what and how subject matter was included in the curriculum, and in classroom management strategies. These theories were tested repeatedly during the interactive phase of teaching. Each time a theory built upon a value belief "worked" in the enabler's view, she was confirming the theory, and her belief in it became strengthened. Confirming the theory and saying it "worked" were part of the same phenomenon, both being part of the enabler's judgment. Theories that were tested and did not "work" in the enabler's view, were modified on the basis of the evidence, but the value belief from which the theory was generated remained unchanged.

The identification of the factor (process) of using value beliefs as a working premise seems to be consistent with Clark and Peterson's (1986) findings that "a teacher's cognitive and other behaviors are guided by and make sense in relation to a mixture of theories, beliefs, and values about the teacher's role and about the dynamics of teaching and learning" (p.287).

A cognitive framework seemed to exist that was based on the value beliefs of the enablers. This framework influenced how the enablers perceived the information they were gaining and motivated them to action. This is similar to the construct of "perspectives," defined by Becker et al. (1961) as being "a coordinated set of ideas and actions a person uses in dealing with some problematic situation" (p.34). Perspectives were further described as differing from attitudes in that perspectives

included actions and not merely the disposition to act. Perspectives were also described as differing from the commonly held notion of values because values represented generalized beliefs while perspectives were specific to given situations.

#### Aggressively Seeking Knowledge

Knowledge was aggressively sought during the preactive phase of teaching so the enablers would have more insight as they engaged in the problem solving skill of decision making. The knowledge was sought to help the enablers know of a greater variety of options and to better understand these options. Knowledge was sought with regard to programs and curriculum, subject matter, teaching strategies, general learner characteristics, and for these enablers, specific gifted learner characteristics. This knowledge was both theoretical knowledge derived from research and craft knowledge passed on by other educators as theories about teaching and learning that were based on the experiences of those educators.

Theories from the scientifically-derived knowledge and the craft knowledge were integrated into the belief systems of the enablers in such a manner that there was consistency between the scientifically-derived theories, the experience-based or craft knowledge theories, and the value beliefs of the enablers. Sometimes this entailed a blending of theories, which resulted in an enabler's unique theory. Other times, a theory based on scientifically derived knowledge, or one based on craft knowledge might be incorporated "as is" into the enabler's actions. Events might lead the enablers to modify "as is" theories once there was evidence that a particular theory was too limited, not taking into account all the enablers' value beliefs. All planning for and evaluation of instruction was influenced by the theories generated on the basis of the knowledge aggressively gathered during the preactive phase of teaching.

Knowledge was aggressively sought during the interactive phase with regard to

the learners--as groups and as individuals. This knowledge was gained as the enablers watched and listened to the learners during class. Learners were observed intently and their verbal feedback was screened carefully. Learners were encouraged to think aloud, and their thinking was probed. Sometimes, this information would be categorized and developed into fact beliefs, which Davis (1978) described as "convictions about the nature of reality" (p.131). Theories would be generated on the basis of the fact beliefs and used in the preactive phase of teaching to assist in planning or evaluation. At other times, information would be sought from the learner and used as cues during the interactive phase in order to identify problems in student learning or understanding or to solve a problem pertaining to the learner's seeming not to act in accordance with the theories the enabler had built about that learner from previous information.

The knowledge gained during the interactive phase about the learners as a group and as individuals was perceived on the basis of some conceptual structure that was consistent with the enablers' value beliefs. The knowledge was organized into fact beliefs, about which theories were generated with regard to the learners as groups and as individuals. These theories were useful in explaining and predicting student behaviors, both for groups of learners and for individual learners.

Knowledge was also sought during the interactive phase about "how well something worked." This type of knowledge was the evidence that added up to experience. Problem solving was carried on as enablers sought to determine why something worked, which was necessary to know if one were to be able to generate a theory that could predict under what circumstances it would work again. Problem solving was not an end in itself for the enablers, but led to an accumulation of experiences that were categorized into a series of fact beliefs.

On the basis of repeated experiences, fact beliefs would be developed about what



"worked." Theories would be developed with regard to how it "worked," when it would "work," and why it "worked." These might be in relation to teaching strategies, the use of materials, or classroom management strategies. These theories would be generated from the evidence or the experience of the enablers and would serve to explain why something worked, as well as to predict under what conditions, and to what extent it might work again. While the events that generated the development of the theory might be gleaned during the interactive phase, many times the theories themselves were generated in the preactive phase activity of evaluation, or used in the preactive phase activity of planning.

The factor (process) of aggressively seeking knowledge is consistent with Berliner's (1987) finding that teachers only learned from their experiences when they were highly motivated to learn and actively applied metacognitive skills to do so. Apparently, this high level of motivation was related to the "wanting to know" value belief that was characteristic of the enablers in this study.

In addition to the cognitive framework of value beliefs that was discussed above, the building of fact beliefs from knowledge as it was gained, resulted in further development of cognitive schemata or conceptual structures, into which individual pieces of information were organized or arranged. According to Berliner (1987), reflective teachers do organize their experiences into cognitive schemata. Furthermore, "A well-developed schemata allows very efficient learning from verbal and written discourse on a topic about which much is known [by the teacher]" (Berliner, 1987, p.61). With regard to this study, as the enablers built their cognitive structures of fact beliefs, they got better at gaining more information and at using it well, whether it was gleaned from further experience, from scientifically derived knowledge, or from craft knowledge.

Building Repertoires of Knowledge and Purposefully Selecting from Them



There was not always an immediate need for knowledge as it was acquired by the enablers. Repertoires were built with the scientifically derived knowledge gleaned from research and with the craft knowledge gleaned from the experiences of others regarding teaching. These repertoires were built during the preactive phase of teaching and were used during both the preactive phase activity of planning and the interactive phase activity of decision making when the enablers would purposefully select from the repertoires in response to an immediate problem. Having a wide repertoire from which to purposefully select was important to the enablers because of their value belief concerning variety in teaching strategies.

The repertoire of fact beliefs was built on the basis of personal teaching experience. Fact beliefs were built during the interactive phase when the events were in progress, as well as during the preactive phase when the enablers would think back on events from the interactive phase. The repertoire of fact beliefs was useful in generating theories that explained events, helping the enablers to understand and categorize similar events with speed and accuracy during successive interactive phases. The repertoire of fact beliefs was also helpful to the enablers as they generated theories based on the fact beliefs and used these as part of the problem solving skills of decision making in the preactive phase planning. For this, the fact belief theories were used to predict with regard to the interactive phase.

The factor (process) of building repertoires of knowledge from which to purposefully select seems to be related to the "schemata" or "schema" used by cognitive psychologists to describe the way knowledge is stored in memory. Nisbett and Ross (1980) describe this:

People's generic knowledge also seems to be organized by a variety of . . . "schematic," cognitive structures (for example, the knowledge underlying one's awareness of what happens in a restaurant, one's understanding of the Good Samaritan parable,

or one's conception of what an introvert is like). To describe such knowledge structures, psychologists refer to a growing list of items, including "frames," . . . "scripts" . . . "nuclear scenes" . . . and "prototypes" . . . in addition to the earlier and more generic term "schemas" (p.28).

Cognitive psychologists have argued that it is the schemata that affect perception, understanding, remembering, learning, and problem solving.

#### Scrutinizing a Situation to Determine What Is There and Then Assessing the "Gaps"

Value beliefs and fact beliefs developed on the basis of experience were used in the cognitive ordering of observed events. A system of value beliefs provided a criteria for what should be. A system of fact beliefs provided a description of what is, as perceived by the enablers. On the basis of these systems of value beliefs and fact beliefs, the enablers would scrutinize situations involving the subject matter and curriculum, the learner and learning--including learner's thinking, the teacher and teaching strategies, the classroom environment, or the broader concerns of the community or the school district as a whole and as individual classrooms. During the scrutiny, fact beliefs continued to be developed, as did theories concerning those fact beliefs.

The criteria based on the value beliefs and fact beliefs was applied as what existed was assessed as part of the preactive phase activity of planning. The problem solving skill of evaluation was employed, and gaps were identified as those discrepancies that seemed to exist between what was there and what should be there. Theory building occurred again at this point as the enablers theorized about what the gaps were, what relationship existed between what was there and what was not there, and how the gaps might be filled.

During the interactive phase of teaching, enablers entered into the problem solving skill of evaluation with regard to learners and their learning as it pertained to the

thinking or knowledge of the learners. Enablers scrutinized the knowledge of the group this way, and used verbal feedback to determine what additional or reinforced information the group was needing as part of instruction. Individual learners were encouraged to verbalize their thinking so the enablers could determine what a learner knew about a concept, and what was missing, incomplete, or misconceived. Theories were built about the interrelationships of the events observed during the scrutiny, Theories were also built as the enablers tested previously existing theories with regard to how, when, or why something might "work" in an effort to fill in the "gaps." These theories were either confirmed or modified on the basis of the evidence.

This factor (process) seems to be related to the "schemata" construct of cognitive psychology also. The schema is described as providing a framework for structuring and interpreting experience. This schematic framework is then useful for filling in the gaps in any experience--"for making inferences to complete the picture of associations and causality among events or episodes" (Bromme, 1987, p.149).

#### Relating Pieces to the Whole

The enablers held an holistic cognitive picture of reality. Individual events would be viewed in relation to this bigger picture which was built upon value beliefs and fact beliefs as they were developed and made part of the structure for the bigger picture themselves. As the enablers went about problem solving during the preactive and interactive phases of teaching, they would attempt to fit each new event into the bigger cognitive picture of value beliefs or existing fact beliefs. Events were related to ultimate goals, concepts, generalizations, or the process of whatever was being observed. New theories would be constructed or existing theories would be modified as part of this process.

The factor (process) of relating pieces to the whole relates once again to the

cognitive psychology construct of schemata. It also relates to the "conceptual use of evidence" model that emphasizes the human information processor in accounting for the use of new evidence or observation. The conceptual use of evidence model features new information being processed or acted upon in the user's mind. According to Kennedy (1984),

Evidence is not merely attached to the user's store of knowledge like barnacles are to clams, riding unchanged from one situation to another. . . . It is sorted, sifted, and interpreted; it is transformed into implications and translated into inferences. . . . It is the interpretations and inferences, rather than the evidence per se, that are incorporated into the user's store of knowledge and applied to working situations. (p.225)

Interconnecting Between and Among Value Beliefs, Curriculum Goals, Knowledge, and the Context

As information from observed events was taken in by the enablers, it was interconnected with value beliefs, with the existing knowledge of fact beliefs, or with knowledge about subject matter. New information was automatically processed in this way, and intentionally processed this way at times when purposeful cognitive effort was made to make observed events fit with existing cognitive structures. Processing information this way seemed to make the information more useful.

During the preactive phase when the decision making skill of problem solving was being used for planning, interconnections were made between value beliefs, curriculum goals, knowledge of the subject matter, and knowledge of the unique learners who would be participating in the learning. Theories were used to explain and predict the relationships that might exist between the above variables. During the preactive phase activity of evaluation, when either preactive phase activities were being evaluated, or when interactive phase teaching episodes were being evaluated, providing information for theory building and future problem solving, the variables were interrelated once again

in order to glean more meaningful and useful information from them.

During the interactive phase of teaching, student cues were processed in relation to the value beliefs of the enabler, the learning goals for the lesson, and the subject matter knowledge and skills of the enablers. Learning goals for any given lesson were never simple, but rather the lesson served to teach a variety of lessons, on a multitude of levels, to the learners. New learning for learners was purposefully interconnected with previous learning or knowledge of the learners by the enablers. This was interconnected with a value belief about learning needing to be related to "real life" and with a fact belief that learners learn better when they are aware of the relationships between content and skills.

The factor (process) of interrelating new information and existing information with value beliefs and existing fact beliefs is explainable by the cognitive psychology construct of schemata once again. A theory related to this construct is the Proster Theory of learning (Hart, 1981). According to this theory, thinking is done in "programs" and "patterns". A program is a series of steps used to accomplish a foreseen goal. Learning is defined as the acquisition of useful programs. These programs are stored in the brain and organized into patterns. Then, these patterns are recognized as they are encountered by the learner in a new event or context. New information is processed on the basis of existing programs and patterns, but also serves to modify existing programs and patterns.

#### Balancing Between Structure and Flexibility

Because of the constant willingness of the enablers to take in information and to act upon it, there was necessarily a need for flexibility. Due to the constant organizing of information into fact beliefs or other structures of knowledge on the basis of value beliefs, structure was cognitively created and did exist for the enablers. Each new event

or information was perceived and processed on the basis of the structure in which it fit.

New information about subject matter, curriculum goals, or teaching strategies was incorporated into existing cognitive structures of value beliefs and fact beliefs about the subject matter, curriculum goals, and teaching strategies during the preactive phase activity of planning. Theories were generated with regard to the new information, dealing with questions about how it related to existing knowledge, how the new and existing knowledge interrelated, and what the implications of the new knowledge might be. In addition, new information about learners was organized into new or existing fact beliefs and considered in the process of planning. As the enablers acted upon this theory building and theory modification, their plans were changed to accommodate the new information.

It was during the interactive phase of teaching that balancing between structure and flexibility became extremely evident. Because the enablers were constantly aggressively seeking cues from the learners, they were needing to deal with a barrage of on-the-spot information, which they did not ignore, but upon which they acted, relating the new information to existing cognitive structures and formulating new theories at a very fast pace. They were also testing existing theories that represented "what works" from their experience.

Cognitive psychologists suggest that learning does not occur in a neat, linear or sequential manner as was once thought. Though teaching has aims or goals for learning and a planned method for achieving these, teachers find they must be flexible in order to deal with the constant influx of information from learners with regard to the learner's thoughts or actions.

#### Implications of the Research

This research has shown that reflection plays an important role in teaching. Some

teachers, at least, are reflective professionals who engage in a type of problem solving as they seek to integrate their value beliefs, theoretical knowledge, craft knowledge, and experience with the context in which they teach. From this problem solving type of activity, these teachers build their own theories about teaching. These theories then enter into the continuous process of problem solving in the form of experience as each unique context is encountered. The factors of reflection, as described and defined in this study, are utilized in both the preactive and interactive phases of teaching, leading one to conclude that thinking in these two phases is not qualitatively different as has been suggested in previous literature. It is the pacing that is varied, factors being utilized much more rapidly during the interactive phase than in the preactive phase.

This study has broadened the definition of what teaching is by adding rich description of the mental activities of teachers to the existing body of research that describes the visible behaviors of teachers. This study has also focused on the whole process of teaching and the relationships between reflection-on-action and reflection-in-action, as well as on the relationships between preactive and interactive phase thinking and actions. Research on teacher thinking is relatively new and each new study breaks ground at this point. There is need to be more studies that investigate the full range of teacher thinking, as this one did, to further substantiate or modify the findings of this study. The claim of analytic induction that the subsequent theory accounts for all negative and positive instances of a phenomenon facilitates the next research in picking up where this study leaves off to look to a single contradiction.

There is relatively little known about how value beliefs develop for teachers. From this study, the importance of value beliefs to a teacher's cognition can not be denied or ignored. More needs to be known about how and why value beliefs develop, and how they can be influenced. The question as to whether certain value beliefs are

preferable to others also needs to be investigated.

This study has provided insight into how teachers go about developing professional knowledge. More needs to be known about how teachers become reflective practitioners so that knowledge may be used in preparing new teachers or less reflective teachers to utilize reflection in teaching, assuming that it is reflection that will move them closer to becoming expert teachers or enablers.



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